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Morphometric characterization of West African Dwarf Sheep in Remo zone of Ogun State

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Target Audience: *Researchers, Livestock producers, Development officers*

Abstract

The study attempted application of morphometric parameters in the assessment of phenotypic variation among West African Dwarf sheep in Three (3) Local Government Area (LGA) of Remo province in Ogun State using phenotypic traits namely, Horn Length (HL), Head Width (HW), Head Length (H^DL), Shoulder Width (SW), `Foreleg Length (FL), Hearth Girth (HG), Rump Length (RL), Pauch Girth (PG), Wither Heart (WH), Tail Length (TL), Ear Length (EL), Thorax Depth (TD) and Body Length (BL). Data were collected from 150 sheep comprising of male and female animals. Analysis was done using SPSS (2001) statistical package to obtain the means, standard deviations, standard error and coefficient of variation from the data collected which was subsequently used for classification. The result showed no significant different ($P < 0.05$) for all the phenotypic traits measured across all the LGA except EL, H^DL and HG that were significantly different ($p < 0.05$) in Ikenne and Sagamu LGA. The mean for EL, H^DL and HG ranged between 9.88 cm in Ikenne LGA and 10.64 cm in Remo LGA, from 23.28 cm in Ikenne LGA to 24.62 cm in Remo LGA and from 26.88 cm in Ikenne LGA to 29.00 cm in Sagamu LGA respectively showing the variation in the population studied.

Key words: Morphometric parameters, Ogun State, Remo, West African Dwarf Sheep

Description of Problem

West African Dwarf (WAD) sheep is a trypanotolarent species of small ruminants reared by small holder farmers in south Western Nigeria (10). The National population commission (12) puts the population of sheep in Nigeria at 29.0million. The WAD sheep are the predominant breed of sheep in the humid tropics. Adult males weigh approximately 37kg and are horned. Ewes are polled and have mature weigh of 25kg. They can breed at age of 7-8 months, (17). They tend to have a short lambing interval with prolificacy of adult ewes ranging from 1.15 to 1.50 lambs per lambing season (10, 17). Sheep farming as a component of the livestock industry is extensively practiced in developed countries specifically for its products of meat, wool and other fibers (6). The economic importance of sheep in developing nation cannot be over emphasized, sheep with their small body size have high productive capacity and rapid growth rates that are ideally suited production by poor small holder. According to (1), in sub-Sahara Africa sheep provide almost 30% of meat consumed and around 16% of the milk produced. Sheep contributes about 50% of the domestically produced meat. Nigeria possesses about 22.1 million sheep and they thrive in a wide variety of environments in the tropics and sub-topics. It requires less capital as they can be completely maintained in pastures browse, and

Agricultural waste products (9). (18) reported morphometric characterization of Nigeria indigenous sheep using multi factorial discrimination analysis and it revealed that tail length was found to be the most discriminating variable between Yankasa and WAD sheep. The univariate analysis also revealed that the body measurement of Balami sheep were significantly larger ($P<0.05$) than others (Uda, Yankasa, and WAD) with the exception of tail length. This study was repeated for WAD sheep in Remo province of Ogun State (Ikenne, Sagamu and Remo North LGAs).

The main objective of this study is to examine the existing variations in the morphometris traits among West African Dwarf sheep in Remo zone of Ogun State. Other specific objective of this study include, determining the effect of sex on the morphometric traits of WAD sheep in the studied area and characterizing the sheep based on this measurement.

The following hypotheses were formulated and stated in null form.

1. H_0: There is no significant difference in the morphometric traits of WAD sheep from the studied area.
2. H_0: There is no significant difference in the sex effect on the morphometric traits of WAD sheep in the studied area.

Materials and Methods

Experimental Animals

Animals for the experiment were WAD sheep. Ten (10) animals were sampled per town. Thus fifty (50) animals were sampled for data collection from each LGA which summed up to 150 animals from the three LGAs selected for the study area. The three LGAs are Ikenne, Sagamu and Remo. In each LGA, five sampling area were randomly selected, and they include Iperu-Remo, Ilisan-Remo, Ogere-Remo, Irolu and Ikenne for Ikenne LGA. In Sagamu LGA the sampling area include Ogijo/Ikosi, Agbowa town, Surulere town, Sabo town and Ayegbami town. For Remo LGA, Isara town, Ilara town, Ode-Remo town, Akaka town and Orile-Oko town were randomly selected. The predominant of livestock management system found in the area is extensive system. Body measurement includes. Horn length, head width, head length, shoulder width, foreleg length, heart girth, rump length, pauch girth, wither height, tail length, ear length, thorax depth and Body length.

Data Collection

Physical body parameters were on each WAD sheep, this was done using flexible measuring tape, while the sheep were standing on a leveled surface. The parameters were measure as follows.

a. Horn length (HL): Length of the horn from its rest to the top.
b. Shoulder width (SW): Distance between the right and left shoulder point.
c. Foreleg length (FL): The distance from the proximal extremity of the foreleg to the mid-lateral.
d. Head length (H^DL): This is the distance between the horn
e. Head Width (HW): This is the distance from poll to nostril.
f. Body length (BL): Distance from point of shoulder to pin bone.
g. Rump length (RL): Distance from the point of isocheim to the pin bone.
h. Tail length (TL): Measured from the base of the tail to the end of the coccygeal vertebrae.
i. Ear length (EL): Ear length is the distance between the tip of the Ear and the base.
j. Wither Height (WH): This is the highest point measured as the vertical distance from the top of the shoulder to the ground (button of forelegs).
k. Pauch Girth (PG): Measured immediately posterior to the last rib.
l. Heart Girth (HG): The smallest

circumference of the chest posterior to the forelegs at right angles for the body axis/chest girth.

Statistical Analysis

Mean Standard Deviations and Coefficient of variation of the phenotypic characteristics of WAD sheep were computed using (15) statistical package. This analysis is a multi-variant technique that describes the relationships between sets of variable by calculating the linear combination that are maximally correlated (16).

Results and Discussion

Table 1: Mean of body measurement (cm), standard deviation (SD) and standard error (SE) OF WAD sheep in Ikenne LGA.

Parameters	N	Mean	STD. Deviation	STD. Error
Horn length	50	4.62	6.45	0.91
Head width	50	11.82	1.20	0.16
Head length	50	23.28	2.37	0.33
Shoulder width	50	17.04	2.93	0.41
Foreleg length	50	37.44	2.46	0.33
Heart girth	50	26.88	3.55	0.50
Rump length	50	19.22	1.86	0.26
Pauch girth	50	26.16	2.35	0.33
Wither heart	50	56.56	3.48	0.49
Tail length	50	26.18	3.62	0.51
Ear length	50	9.88	0.77	0.11
Thorax depth	50	20.70	2.64	0.37
Body length	50	58.18	3.65	0.52

[a]S.E- Standard Error: SD- Standard deviation

Table 2: Mean of body measurements (cm), standard deviation (SD) and standard error (SE) of WAD sheep in Sagamu LGA.

Parameters	N	Mean	STD. Deviation	STD. Errors
Horn length	50	5.10	6.40	0.91
Head width	50	12.10	1.23	0.17
Head length	50	24.46	2.65	0.38
Shoulder width	50	16.04	2.18	0.31
Foreleg length	50	36.96	3.43	0.48
Heart girth	50	29.00	3.55	0.50
Rump length	50	19.08	2.28	0.32
Pauch girth	50	26.38	3.24	0.46
Wither heart	50	56.58	4.37	0.62
Tail length	50	26.30	3.28	0.46
Ear length	50	10.32	1.24	0.17
Thorax depth	50	20.78	2.55	0.36
Body length	50	58.64	4.19	0.59

[a]S.E- Standard Error: SD- Standard deviation

Table 3: Mean of body measurements (cm), standard deviation (SD) and standard error (SE) of WAD sheep in Remo LGA.

Parameters	N	Mean	STD. Deviation	STD. Errors
Horn length	50	4.20	5.71	0.81
Head width	50	12.02	1.20	0.17
Head length	50	24.62	2.60	0.37
Shoulder width	50	16.40	2.19	0.31
Foreleg length	50	37.62	3.57	0.51
Heart girth	50	27.64	3.66	0.52
Rump length	50	19.84	2.16	0.31
Pauch girth	50	26.74	3.10	0.44
Wither heart	50	51.84	2.96	0.42
Tail length	50	26.66	4.33	0.61
Ear length	50	10.64	1.72	0.24
Thorax depth	50	20.18	2.74	0.39
Body length	50	58.78	3.45	0.49

[a]S.E- Standard Error: SD- Standard deviation

Table 4: Descriptive statistics of phenotypic traits of WAD sheep in Remo zone of Ogun State.

Parameters	Mean ± S.E	SD	CV
Horn length	4.75± 0.51	6.22	130.95
Head width	11.98± 0.97	1.18	9.85
Head length	24.13± 0.21	2.59	10.73
Shoulder width	16.49± 0.20	2.47	14.98
Foreleg length	37.33± 0.26	3.18	8.52
Heart girth	27.77± 0.31	3.79	13.65
Rump length	19.38± 0.17	2.12	10.94
Pauch girth	26.39± 0.24	2. 95	11.18
Wither heart	56.98± 0.30	3. 68	6.46
Tail length	26.34± 0.30	3. 72	14.12
Ear length	10.27± 0.10	1.34	13.05
Thorax depth	20.52± 0.22	2. 69	13.11
Body length	58.53± 0.31	3.75	6.41

[a]S.E- Standard Error: SD- Standard deviation; CV – Coefficient of variation

Table 5: Test of Significance for Horn Length in Remo Province

Test value = 4.75 Horn Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-0.14	49	0.89	-013	-1.96	1.70
Sagamu	072	49	0.47	0.67	-1.19	2.53
Remo	-0.68	49	0.50	-0.55	-2.17	1.07

[a] LG = Local Government

Table 6: Test of Significance for Head Width in Remo Province

Test value = 11.98 Head Width (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	0.88	49	0.39	-0.14	-0.46	0.18
Sagamu	0.69	49	0.50	0.12	-0.23	0.47
Remo	0.24	49	0.82	-0.44	-0.30	0.38

[a] LG = Local Government

Table 7: Test of Significance for Head Length in Remo Province

Test value = 24.13 Head Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	0.54	49	0.001	-0.85	-1.52	0.18
Sagamu	0.93	49	0.36	0.35	-0.40	1.10
Remo	1.33	49	0.19	0.49	-0.25	1.23

[a] LG = Local Government

Table 8: Test of Significance for Shoulder Width in Remo Province

Test value = 16.49 Shoulder Width (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	1.28	49	0.21	0.53	-0.30	1.36
Sagamu	-1.46	49	0.15	-0.45	-0.07	0.17
Remo	-0.29	49	0.77	-0.009	-0.71	0.53

[a] LG = Local Government

Table 9: Test of Significance for ForeLeg Length in Remo Province

Test value = 37.33 Foreleg Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	0.31	49	0.75	0.11	-0.59	0.18
Sagamu	-0.80	49	0.42	-0.39	-1.37	0.59
Remo	0.57	49	0.57	0.29	-0.73	1.31

[a] LG = Local Government

Table 10: Test of Significance for Heart Girth in Remo Province

Test value = 27.77 Heart Girth (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-1.77	49	0.08	-0.89	-1.89	0.12
Sagamu	1.83	49	0.007	1.03	-0.10	2.16
Remo	-0.25	49	0.80	-0.13	-1.17	0.91

[a] LG = Local Government

Table 11: Test of Significance for Rump Length in Remo Province

Test value = 19.38 Rump Length (LG)	t	Df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	upper
Ikenne	-0.60	49	0.55	-0.16	-0.69	0.37
Sagamu	-0.93	49	0.36	-0.30	-0.93	0.35
Remo	1.51	49	0.14	0.46	-0.15	1.07

[a] LG = Local Government

Table 12: Test of Significance for Pauch Girth in Remo Province

Test value = 26.39 Pauch Girth (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-0.69	49	0.49	-0.23	-0.89	0.44
Sagamu	-0.23	49	0.82	-0.11	-1.06	0.84
Remo	0.80	49	0.43	-0.35	-0.53	1.23

[a] LG = Local Government

Table 13: Test of Significance for Wither Height in Remo Province

Test value = 56.98 Wither Height (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-0.85	49	0.39	-0.42	-1.41	0.57
Sagamu	-0.71	49	0.48	-0.44	-1.69	0.81
Remo	2.06	49	0.05	0.86	0.02	1.70

[a] LG = Local Government

Table 14: Test of Significance for Tail Length in Remo Province

Test value = 26.34 Tail Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-0.31	49	0.76	-0.16	-1.19	0.87
Sagamu	-0.36	49	0.72	-0.16	-1.06	0.74
Remo	-0.32	49	0.60	-0.32	-0.91	7.55

[a] LG = Local Government

Table 15: Test of Significance for Ear Length in Remo Province

Test value = 10.27 Ear Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-3.57	49	0.001	-0.39	-0.61	-0.17
Sagamu	0.17	49	0.87	0.03	-0.33	0.39
Remo	-1.52	49	0.14	-0.37	-0.12	0.86

[a] LG = Local Government

Table 16: Test of Significance for Thorax Depth in Remo Province

Test value = 20.52 Thorax Depth (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne LG	0.48	49	0.63	0.18	-0.57	0.93
Sagamu LG	0.42	49	0.68	0.16	-0.61	0.93
Remo LG	-0.88	49	0.38	-0.34	-1.12	0.44

[a] LG = Local Government

Table 17: Test of Significance for Body Length in Remo Province

Test value = 58.53 Body Length (LG)	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Ikenne	-0.68	49	0.50	-0.35	-1.39	0.68
Sagamu	0.19	49	0.85	0.11	-1.07	1.29
Remo	0.51	49	0.61	0.25	-0.73	1.23

[a] LG = Local Government

Variation within and among animal genotypes is fundamental to breed characterization and adaptation to particular ecological zones all over the world. Nonetheless, any variation within or among any species is best and easily used as evidence in the morphological characteristics of members of the species. Mammalian body measurements are used to make taxonomic, behavioural and ecological comparisms and for promulgation of several rules to explain introspected variation in morphological differences over breeds and environmental gradients, (3). Morphological characterization of a breed assist in breed description and setting breed standards, thus allowing distinction between breeds and strains (11).

Tables 1, 2 and 3 showed the summary of all the mean, standard deviation and standard error for all the body parameters measured in Ikenne, Sagamu and Remo LGA. The mean for HL ranged between 4.20 cm in Remo LGA and 5.10 cm in Sagamu LGA. The mean for HW ranged between 11.82 cm in Ikenne LGA and 12.10 cm in Sagamu LGA. The mean for H^DL ranged from 23.28 cm in Ikenne LGA to 24.62 cm in Remo LGA. Average SW ranged between 16.04 cm in Sagamu LGA and 17.04 cm in Ikenne LGA. Average FL ranged between 36.96 cm in Sagamu LGA and 37.62 cm in Remo LGA. Average HG ranged between 26.88 cm in Ikenne LGA and 29.00 cm in Sagamu LGA, the mean estimates recorded for HG was lower to what was reported for Nguli sheep (67.68cm) by (8). The mean for RL ranged from 19.08 cm in Sagamu LGA to 19.84 cm in Remo North LGA. The mean for PG ranged from 26.16 cm in Ikenne LGA to 26.74 cm in Remo LGA. The mean for WH ranged from 51.84 cm in Remo LGA to 56.58 cm in Sagamu LGA. (2) reported mean value of 67.50 cm for wither height in Ganjam sheep which is higher than the value obtained in this study but it is higher than what was reported (52.93 cm) for Mecheri sheep by (7). Average TL ranged between 26.16 cm in Ikenne LGA and 26.66 cm in Remo LGA. Average EL ranged between 9.88 cm in Ikenne LGA and 10.64 cm in Remo LGA. Average TD ranged between 20.18 cm in Remo LGA to 20.78 cm in Sagamu LGA. The mean for BL ranged from 58.18 cm in Ikenne LGA to 58.78 cm in Remo LGA. The average BL estimates for WAD sheep in this local government is lower than what was reported for Mecheri sheep (70.90 cm) by (7). Table 4 showed that the mean ranged between 4.75cm in the HL and 58. 53cm in BL, the standard deviation ranged between 1.18 in HW and 6.22 in HL while the coefficient of variation ranged between 6.41 in BL and 130.95 in HL. Table 5, 6, 8, 9, 11,12,14,16, and 17 showed no significant difference ($P<0.05$) in value of all the horn length, head width, shoulder width, foreleg length, heart girth, rump length, pauch girth, tail length, thorax depth and body length respectively across all the LGAs in Remo province. In Table 7, a high significant

difference (P<0.01) in the value of head length was revealed in Ikenne LGA while no significant difference (P<0.05) was found in the value for HL measured from Sagamu and Remo LGA. This significant difference obtained could be as a result of massive migration of rams from north to south during festival periods which might have led to crosses with other breeds. Table 10 showed no significant difference (P<0.05) in the value of the heart girth measured across all the LGA except from Sagamu LGA. Table 13 indicated a significant difference (P<0.05) in the value of wither height while no significant difference was found in the value of wither height measured from Ikenne and Sagamu LGA. The significant difference observed agreed with report of (14) that WH was among the six variables used to place WAD and Yankasa sheep. Table 15 revealed a very high significance different (P<0.001) in the value of ear length from Ikenne LGA while no significant difference was found in the value for ear length measured from Sagamu and Remo LGA.

Conclusion and Application

In this work, we have demonstrated that

1. Native breeds of WAD sheep are an important part of indigenous landscapes and culture, hence the need to maintain them.
2. Maintaining this genetic variation is pertinent if the WAD sheep is to continue to improve the performance of animals in response to their varying environmental conditions.
3. Current information on the phenotypic characteristics of the WAD sheep breeds could be complemented with genetic characterization using DNA makers, and concise farmer's oriented management strategy to avoid in breeding and indiscriminate cross breeding.
4. There is a need to initiate a sustainable breeding programme for the preservation of the genetic diversity of WAD sheep in Remo provinces.

References

1. Adedeji, T.A., Ozoje, M.O., Peters, S.O., Sanusi, A.O., Ojedapo, L.O. and Ige, A.O. 2011. Coat pigmentation and Wattle genes effect on some haematological characteristics of heat stressed and extensively reared West African Dwarf goats. *World Journal Life Science Medical Research*, 3: 48–55.
2. Arora R., Bhatia, S. Jain A., (2010). Morphological and Genetic Characterization of Gamjam Sheep. Annual Genetic Resources, 46, 1-9.
3. Brown, D.E, Maher, C.R., and Plitchell, C.D., (2006). A comparism of Pronghan body measurement throughout Western North America, Proceedings of the 22nd Mennial Prongham Workshop. Pp 13-125
4. Census (1991). (i) The Census Adjustment under Count or Bad data, Statistical Science. (ii) Principle and Recommendation for Population and Housing Census Statistical Paper Series M, No. 67/Rev. 2.
5. Census (2006). Population of Nigeria Press release on History of Ogun State Post Offices with Map of LGA Retrieved 2009-10-20 http://allafrica.com/
6. Gatenby, R.M. 2002. *Sheep: The Tropical Agriculturist.* 2nd Revised Edition. CTA Macmillan, Netherlands. Pp 1, 61-63.
7. Karunanithi K., Purushothaman M.R, Thiruvenkadan, A.K., Singh G., Sadana, D.K. and Murugan M. (2005). Breed Characteristics of Mecheri Sheep. *Animal Genetic Resources Information* 37, 53-62.
8. Kunene, N.W., Nesamuuni, A.E, Nsahlai, I.V. (2009). Determination of Prediction Equations for estimating body weight of

Zulu (Nguni) sheep. Small Ruminant Research, 84: 41-46.
9. Mack, S. D. (1983). Evaluation of the Productivity of West African Dwarf Sheep and Goats in South West Nigeria.Humid zone programme Document No.7. *International Livestock for Africa*, Ibadan, Nigeria. 55pp.
10. Mason, I.L. (1988). World dictionary of livestock breeds, third ed. C.A.B. International, Okalahoma state University Board of Regents.Pp. 55-110.
11. Mc. Manus, C.M., Falao, R.A., Spritze, A., Coata, D., Louvandini, H., Dias (2005). Morphological Charac-terization of Breed. *Animal Science* 45: 362-370.
12. National Population Commission (2004). New Partnership for Africa's Development Comprehensive African Agricultural Development Programme, Nigeria, 316.
13. Odubote I.K, (1994). Genetic analysis of the reproductive performance of West African Dwarf Goats in the humid tropics in Ruminant Research and Development in Africa. Eds Lebbie, S.H.B. & Kagwini, E., Proc. Third Biennial Conference of African Small Ruminant Research Network, Kampala, Uganda . 5-9 December, 1994. Pp.33-36.
14. Salako O.E and Ngere L.O. (2002). Application of multifactional discriminant analysis in the Morphometric Structural differen-tiation of the WAD and Yankasa Sheep in the Humid South West Nigeria, *Nigerian Journal of Animal Production*. 29(2): 163-167.
15. SPSS (2001). Statistical Package for the Social Science, New York, SPSS Inc.
16. Tabaclinick B.G. and Fidel, L.S. (2001). Using multi-variate statistics. Allyn and Bacon; Boston, USA Pp966.
17. Thomas, D.L. (1991). Hair sheep Genetic Resource of the Americas. Proceedings Hair Sheep Research symposium university of the Virgin islands.
18. Yunusa, A.J., Salako, A.E. and Oladejo, O.A. 2013. Morphometric characterization of Nigerian indigenous sheep using multifactorial discriminant analysis. *International Journal Biodiversity Conservation*, 5(10): 661–665.